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GC-MS metabolomics revealed protocatechuic acid as a cytotoxic and apoptosis-inducing compound from black rice brans

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Abstract

GC-MS metabolomics was used to discriminate the phytochemicals profile of Indonesian white, red, and black rice brans, and Japanese white rice brans. This technique was used for the first time to identify compounds in rice brans having cytotoxic activity against WiDr colon cancer cells. Orthogonal Projection to the Latent Structure (OPLS) analysis showed that protocatechuic acid (PA) was a discriminating factor found in black rice brans which strongly correlated with its cytotoxicity (IC50 8.53 +/- 0.26 mu M). Real time-PCR data demonstrated that PA cytotoxicity at different concentrations (1, 5, 10, 25 and 50 mu g/mL) was mediated through different pathways. Bcl-2 expression was downregulated at all tested concentrations indicating apoptosis stimulation. At 1-10 ppm concentration, PA activated both intrinsic and extrinsic apoptosis pathways since the expression of p53, Bax, caspase-8, and caspase-9 were upregulated. At a higher dose (25 and 50 mu g/mL), PA possibly involved in pyroptosis-mediated pro-inflammatory cell death by upregulating the expression of caspase-1 and caspase-7.

Keywords

Author Keywords: Rice brans; Cytotoxicity; Apoptosis; Metabolomics; Protocatechuic acid  
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